

Electronic structure of polychiral carbon nanotubes

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Most of the works devoted so far to the electronic band structure of multiwall carbon nanotubes have been restricted to the case where the individual layers have the same chirality. On the contrary, little is known on the electronic properties of multiwall nanotubes that mix different chiralities. These are interesting systems, however, since they can be composed of both metallic and semiconducting layers. In the present work, we have used a tight-binding based recursion technique to investigate the effect of the interlayer coupling on the electronic properties of polychiral two-layer nanotubes such as (9,6)@(15,10), (6,6)@(18,2), and others. For the sake of understanding experimental results, constant-current STM images were also calculated for these systems. We have found that the image of a two-wall nanotube is mostly the same as the one of the isolated external layer. The interlayer effects can only be seen on the STM topography in the case of monochiral, commensurate structures like (5,5)@(10,10).